3.6: DELICIOUS DNA

Introduction

Are you hungry? I hope so, because it's time to build your own model of DNA! DNA is like a secret code that holds the instructions for how living things grow, function, and look. But what does DNA have to do with eating? Good question. In this activity, you'll build your own model of a DNA molecule using colorful candy to represent the four bases: A, T, C, and G. This will help us see how DNA is structured so that we can see how scientists might alter DNA to make superhumans.

You'll see how these bases pair up, how the DNA strands are held together, and what the famous double helix really looks like. Get ready to explore the building blocks of life—one base pair at a time, and maybe have a little snack along the way. 😋

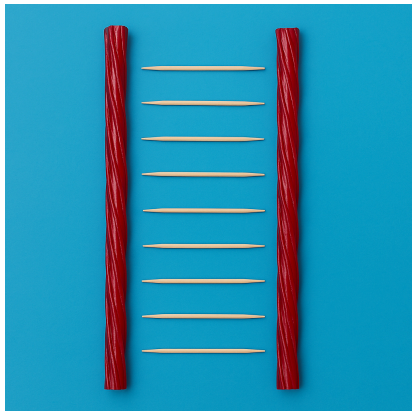
Build a DNA Model

Materials:

- Gummy/chewy candy (e.g., mini marshmallows, gumdrops, gummy bears) in 4 different colors; about 6 pieces of each color
- 9 Toothpicks
- 2 licorice ropes

Directions:

1. **Prepare the DNA ladder.** Lay out the two licorice ropes vertically to represent the sides (backbone) of the DNA molecule. Then, place 9 toothpicks horizontally between the licorice ropes to represent the base pairs. **Important:** Do **not** attach the toothpicks to the licorice yet.



2. **Complete the DNA sequence.** A DNA molecule has two sides: the coding strand and the complementary strand. In order to build your model, you need to figure out which bases will be added to each of the toothpicks.
    A. **Coding Strand:** The coding strand below includes 8 of the 9 bases. Choose one base (A, T, C, or G) to fill in the missing spot.
    B. **Complementary Strand:** Now fill in the complementary bases that will pair up with each base in the coding strand. Two bases have already been filled in for you. Remember:
        - A and T pair up together
        - C and G pair up together

Model DNA Sequence	
Coding Strand	**Complementary Strand**
A	
T	A
G	
C	
C	
G	C
A	
T	

3. **Make a candy color key.** Choose one color of candy to represent each DNA base (A, T, C, and G). Record your key so you can follow it as you build your model.

Key	
Base	**Candy Color**
Adenine (A)	
Thymine (T)	
Cytosine (C)	
Guanine (G)	

4. **Build your DNA base pairs.** Now it's time to use your candies to build the steps on your DNA ladder. Place two candies on each toothpick to represent the DNA base pairs. How will you know which color candies to use? Look at the Model DNA Sequence table above to figure out which base pairs belong on each step of the DNA ladder, and use your key to determine which color candies are needed to represent each base pair.

5. **Attach the DNA backbone.** Carefully attach the licorice ropes to each side of your DNA ladder, running alongside the ends of the toothpicks. This represents the backbone of the DNA molecule. When you're done, carefully pick up your DNA model and gently twist it to form the classic double helix shape. (Your model won't stay in the twisted ladder shape on its own. After you test it out, you can lay your model flat on the table again.

Investigation Reflection

1. What are some strengths of this candy and toothpick model?

2. What are some limitations of using this candy and toothpick model to represent DNA?

3. Imagine that the DNA model you built is a section of DNA that gives unicorns their fur color. Also imagine that another student picked a different base to fill in the blank on the DNA coding strand. Do you think these two DNA sequences would result in unicorns with the same fur color or different fur color? Why do you think this?

4. How could scientists use a real DNA sequence to learn about a person or an organism?